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DNA for the defense: New Wright State University software interprets DNA evidence

On trial for rape, Timothy Howard claimed he was innocent. But prosecutors had DNA evidence that placed him at the scene.

Howard's defense attorney hired Dan Krane, an associate professor of biology at Wright State University and DNA expert, to help in her defense of Howard. Krane's interpretation of the DNA evidence shed a much different light on the story jurors would hear.

Patsy Ward, deputy public defender in the county of Los Angeles, was first in line to use the services of Krane's newly formed company, Forensic Bioinformatics Services (FBS). FBS has negotiated with Wright State University for rights to use Genophiler, a software product developed by Krane and his colleagues at Wright State to interpret DNA evidence. With the DNA evidence supported by Genophiler, and Krane, a nationally respected DNA expert on the stand to interpret it, Ward punched holes in the prosecution's case.

Krane didn't refute the prosecutor's DNA evidence that placed Howard at the scene of the crime. But, using the powerful Genophiler software, he kept looking. Krane's interpretation of DNA collected at the scene indicated a third person was present. Had the victim lied? Had the prosecution omitted information that would hurt their case?

In his typically calm and assured manner, Krane took the stand and elaborated on the subtleties of genomics. A university professor for nine years, Krane gave the jury an introduction to DNA that was understandable. They took notes. The courtroom filled with onlookers.

"Dr. Krane destroyed the prosecution's physical evidence," said Ward, who said she "fought tooth and nail" over a period of months to have the prosecution's DNA evidence analyzed. "Just because a defendant is indigent does not mean they don't deserve the best. And that's what Krane is."

Krane's comfort level on the witness stand is an anomaly among genomic scientists. "Emotion-filled courtrooms are often an alien atmosphere for scientists," said Krane. "Some find it an extremely uncomfortable situation while others get caught up in the drama and become advocates. Maintaining objectivity is crucial to effectively presenting scientific interpretations."

Krane was unaware of Timothy Howard's background-and wanted to remain so-when he took the stand as an expert witness for the defense. "There is no room for subjective DNA analysis," he said. "The objective and automated results of the Genophiler analysis allow me to focus and spend my time discussing the most important features of the case. And the graphical output the software generates makes it a much easier job to educate a defense attorney and to illustrate the issues to the jury."

DNA collected at a crime scene and analyzed by the local crime lab does not provide tangible evidence for the defense or prosecution until it has been interpreted. "The DNA testing labs generate electronic data that is only useful to individuals who happen to own a set of software

programs that cost $18,000. The crime labs have them. And the prosecution gets results from the crime labs," said Krane. "This is a problem for the defense bar. They have to tell their clients they can not afford the evaluation needed to challenge the prosecution. What kind of defense can be mounted using the prosecution's evidence?"

Although DNA profiling has been found to be scientifically sound by the court system and the use of DNA as evidence in court is becoming more and more common, there is little industry standard regarding its analysis. And, the science is still so new that even though hundreds of thousands of cases in America are using DNA as evidence, there are only a handful of scientists available to interpret and review test results.

Krane is an expert in bioinformatics who has built a reputation as one of only half a dozen DNA experts in the country who provide counsel for the defense. For the past three years, he has researched the science of DNA profiling with Wright State assistant professors of computer science and engineering Michael Raymer, Ph.D., and Travis Doom, Ph.D., who also specialize in melding the worlds of biology and computer science. Together they created Genophiler, a software program that interprets the automated DNA analysis generated by crime labs. Wright State has filed for the patent on Genophiler and given Krane's fledgling company, FBS, exclusive rights to use it.

Bill Thompson and Simon Ford, DNA experts who also have participated in high profile trials, are also working with FBS. "Simon has reviewed more DNA cases than anyone else in the field and Bill was the brains behind the O.J. Simpson case," said Krane. "We have a unique and unrivaled set of scientists focused completely on the science of DNA analysis and interpretation."

With Genophiler, FBS can automate and explain the cryptic data files generated electronically by the crime lab. The five-to-ten-hours required to begin a review of DNA evidence is now better used consulting with the defense attorney and testifying in court.

Convicting the guilty or exonerating the innocent is not the mission of FBS. "We're concerned that when someone goes on the witness stand wearing the white lab coat of science that it is good science that is being represented," said Doom.

Genophiler interpretation of Timothy Howard's case showed significant omissions in the evidence brought forward by the prosecution. "One case in three has a serious problem that needs to be brought to the defense attorney's attention," said Krane. "We apply the same standards to every case, every day-an objectivity that is necessary in this extremely adversarial situation."

The jury was still out on Timothy Howard when Krane left Los Angeles, headed back to his lab in Ohio. Knowing the outcome of the trial is not a priority for him. Knowing that science was served is.